

Reconstruction of Audit Frameworks from Financial Inspection toward System and Algorithm Evaluation in the Digital Ecosystem

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ARTICLE INFO

Keywords: Digital Accounting, Audit, Algorithms, Information Systems, Quality Audit

Received : 20, May

Revised : 22, June

Accepted: 25, July

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ABSTRACT

This article is motivated by the transformation of the digital ecosystem that drives the shift in auditing from financial inspection to evaluation of systems and algorithms. This study aims to analyze the influence of algorithmic evaluation on audit quality and system reliability. The method used was a quantitative survey of 120 respondents (auditors and IT practitioners) with regression analysis. The results show that evaluation of systems and algorithms improves the accuracy, efficiency, and transparency of audits, with the reliability of the system as the main mediator. It was concluded that the reconstruction of algorithm-based audit frameworks strengthens the relevance of accounting in the digital era.

INTRODUCTION

Digital transformation has become a global phenomenon that is significantly changing accounting and auditing practices. Technological developments such as artificial intelligence (AI), big data analytics, blockchain, and robotic process automation (RPA) are driving a shift from traditional financial inspection-based audits to system-based audits and algorithmic evaluations. Studies show that digitalization improves audit efficiency, accuracy, and transparency, but also poses new challenges related to data security and system complexity (Appelbaum et al., 2022; MDPI, 2024). Globally, the digital economy continues to evolve and increase the complexity of financial reporting, thus demanding a more adaptive and technology-based audit system (Lu, 2024). In the context of Indonesia and developing countries, the adoption of digital audits still faces limited infrastructure and human resource readiness.

This change shifts the audit paradigm from a manual sampling-based approach to thorough and real-time data analysis. Audits no longer only focus on verifying financial statements, but also on evaluating the information systems and algorithms that generate that data. This marks an evolution towards continuous auditing and more proactive data-driven auditing (Alles, 2021; Kokina & Davenport, 2022). This transformation expands the scope of audit from the financial aspect to the systemic and technological aspect.

A number of studies have examined digital transformation in auditing. Abdullah and Almaqtari (2024) found that AI-based digital audit technology and big data are able to improve audit quality and process efficiency. Barr-Pulliam et al. (2022) show that digital innovation provides significant opportunities in improving the quality of auditor judgment. Meanwhile, research by Han et al. (2023) confirms that technology integration allows audits to be more comprehensive and data-driven.

Nevertheless, there is a significant research gap. Most studies still focus on the adoption of technology in auditing, rather than on conceptually reconstructing the audit framework towards the evaluation of systems and algorithms. Ahmad et al.'s (2023) research highlights the variation in technology adoption between organizations, but has not examined the systematic redesign of the audit framework. Yigitbasiglu et al. (2022) also emphasized the importance of auditor digital competence, but have not yet integrated these aspects in algorithm-based audit models.

Another gap lies in the lack of integration between traditional financial audits and algorithmic audits. Bandy (2021) explained that algorithmic audits are still developing and do not have established standards. Costanza-Chock et al. (2023) show that the lack of algorithmic audit standards can reduce the accountability of AI-based systems. This shows the need for a new audit framework that is able to integrate the two approaches.

In addition, previous studies have tended to focus on technological aspects without considering governance and regulatory implications. Zhou (2023) and Liew et al. (2022) show that audit digitization affects cost, risk, and regulatory structures, but there is no audit model that comprehensively accommodates

these changes. Therefore, a more holistic approach is needed in reconstructing the audit framework in the digital era.

Based on these backgrounds and gaps, this study aims to reconstruct the audit framework from a financial inspection approach to the evaluation of systems and algorithms in the digital ecosystem. This research specifically analyzes the relationship between the application of digital audit technology, the reliability of information systems, and audit quality, and develops an integrative conceptual model between financial audits and algorithmic audits.

It is expected to make a theoretical contribution to the development of accounting science by expanding the audit paradigm towards a systems and algorithm-based approach. Practically, this research provides implications for auditors, regulators, and organizations in designing an adaptive, transparent, and technology-based audit system, as well as improving audit quality in facing digital transformation challenges.

LITERATURE REVIEW

Digital Transformation in Accounting and Auditing

Digital transformation has fundamentally changed the accounting and auditing paradigm from a document-based approach to data- and technology-driven systems. The integration of artificial intelligence (AI), big data analytics, and robotic process automation (RPA) allows the audit process to be faster, more accurate, and based on real-time (Hasan, 2022; Atrous, 2025). Studies show that this technology not only improves operational efficiency, but also extends the audit function into a strategic analysis tool in organizational decision-making. In addition, digitalization is driving the change in the role of auditors from auditors of financial statements to systems analysts and evaluators of complex digital processes.

Development of System- and Data-Based Audits

The development of system-based auditing is marked by the emergence of the concept of continuous auditing and data-driven auditing. This approach allows auditors to conduct thorough testing of the entire data population, not just samples, thereby improving the quality and reliability of audits (Alles, 2021). Recent research shows that the use of analytics and machine learning technologies can significantly improve fraud detection and risk evaluation. In addition, digital audit technologies in accounting information systems also play a role in increasing transparency and accountability of the organization through cross-system data integration.

Artificial Intelligence in Auditing and Accounting

Artificial intelligence is the main driver of the reconstruction of the modern audit framework. AI enables routine task automation, predictive analysis, as well as complex algorithm-based anomaly detection (Kokina & Davenport, 2022). Empirical studies show that AI is used in a variety of audit functions, such as risk assessment, fraud detection, and audit opinion enhancement. However, the implementation of AI also faces challenges such as lack of transparency (black box), algorithmic bias, and ethical and data privacy

issues. Therefore, an audit approach is needed that evaluates not only the output, but also the algorithmic processes and logic used.

Algorithm Auditing as a New Paradigm

Algorithmic auditing is the latest development in the audit literature that focuses on the evaluation of AI-based systems and machine learning. This audit aims to ensure that the algorithm works fairly, transparently, and in accordance with applicable standards (Bandy, 2021). Research shows that algorithmic audits include various methods such as code audit, data audit, and behavioral audit to assess the impact of the system on users. In addition, algorithmic audits are multidisciplinary and integrate technical, legal, and ethical aspects in the evaluation of digital systems. This marks a shift in auditing from a financial focus to a holistic evaluation of the system.

Other Technology Integration: Blockchain and Distributed Systems

In addition to AI, blockchain technology also plays a crucial role in audit transformation. Blockchain allows for transparent, immutable, and distributed recording of transactions, thereby improving the reliability of audit data. Recent studies show that blockchain can reduce the risk of data manipulation and improve the efficiency of the audit process, although it still faces implementation and regulatory challenges. The integration of blockchain with AI and cloud computing creates a more complex but also more transparent digital audit ecosystem.

Auditor Competencies in the Digital Era

The transformation of digital audits demands significant changes in auditor competencies. Auditors are not only required to understand accounting principles, but also have the ability to analyze data, program, and understand information systems (Yigitbasioglu et al., 2022). Studies show that technological developments are driving the need for auditors with multidisciplinary competencies who are able to critically evaluate systems and algorithms. The lack of digital competence is one of the main obstacles in the adoption of technology-based audits.

Challenges and Gaps in the Literature

Although the literature shows rapid progress in digital auditing, there are still some research gaps. First, most studies still focus on technology adoption, not on conceptually reconstructing the audit framework (Abdullah & Almaqtari, 2024). Second, research on algorithmic auditing is still limited and has not been integrated with traditional financial auditing practices. Third, the lack of clear standards and regulations related to auditing systems and algorithms is a challenge in practical implementation. The study also shows that the existing audit approach is still partial and has not yet formed a holistic framework.

Literature Synthesis and Direction of Audit Framework Reconstruction

Based on the literature review, it can be concluded that a reconstruction of the audit framework is necessary to integrate financial audits, systems audits,

and algorithmic audits in one comprehensive approach. This approach should include the simultaneous evaluation of data, systems, and algorithmic models, as well as considering ethical, regulatory, and governance aspects. The latest literature emphasizes the importance of developing an audit framework that is adaptive, technology-based, and able to address the complexity of the modern digital ecosystem. Thus, this research contributes to filling these gaps by proposing a more integrative and relevant audit model.

METHODOLOGY

This study uses a quantitative approach with an explanatory research design to examine the causal relationship between system and algorithm evaluation, system reliability, and audit quality in the digital ecosystem. The quantitative approach was chosen because it allows for objective measurement of variables and empirical testing of hypotheses using statistical analysis (Hair et al., 2022). The research design is cross-sectional, where data is collected over a specific period of time to describe the actual state of digital audit practices. This approach is relevant to identify patterns of relationships between variables in the context of technology-based audit transformation (Sekaran & Bougie, 2021).

The population in this study is external auditors, internal auditors, and information technology practitioners involved in the system-based audit process in Indonesia. The sampling technique uses non-probability sampling with the purposive sampling method, which is the selection of respondents based on certain criteria such as at least two years of experience in auditing or information systems. The number of samples was set at 120 respondents, referring to the minimum size recommendations for multivariate analysis and structural equation modeling (SEM) (Hair et al., 2022). The selection of this technique is based on the need to obtain respondents who have relevant competencies in digital auditing, thereby increasing the external validity of the research (Etikan & Bala, 2021).

The data collection technique was carried out through the distribution of an online structured questionnaire using a five-point Likert scale. The research instruments were adapted from previous studies, such as audit quality measurement (Kokina & Davenport, 2022), system reliability (DeLone & McLean, 2003; updated by Petter et al., 2021), and algorithm evaluation (Bandy, 2021). Before use, the instrument was tested for validity through a construct validity test using confirmatory factor analysis (CFA), as well as a reliability test using Cronbach's alpha with a minimum value of 0.70 as the feasibility limit (Hair et al., 2022). This test aims to ensure that the instrument is able to measure variables accurately and consistently.

The research procedure is carried out systematically through several stages. The initial stage includes literature study and preparation of research instruments based on a conceptual framework. Furthermore, a pilot test was carried out on a number of respondents to ensure the clarity and reliability of the instruments. The next stage is the main data collection through the online distribution of questionnaires. After the data is collected, a data screening process is carried out to identify outliers and incomplete data. The final stage includes

data analysis and interpretation of results to answer the research objectives and test the hypotheses that have been formulated.

The data analysis technique used was multiple linear regression analysis to test the influence of system evaluation and algorithms on audit quality, as well as the role of system reliability as an intervening variable. Prior to hypothesis testing, data were analyzed through descriptive statistics to describe respondent characteristics and answer distribution. Furthermore, a classical assumption test was carried out which included normality, multicollinearity, heteroscedasticity, and autocorrelation tests to ensure the feasibility of the regression model (Ghozali, 2021). Testing of the direct influence between variables was carried out through the t-test and the F-test, while the model's ability to explain the dependent variables was assessed through the determination coefficient (R^2). To test the effect of mediation, the Sobel test or path analysis is used as needed by the research model. The entire analysis process was carried out with the help of the latest version of IBM SPSS Statistics software, which was chosen as adequate for inferential quantitative analysis with a cross-sectional research design and moderate sample count (Field, 2021).

RESEARCH RESULTS

Descriptive Statistics and Respondent Characteristics

The results of the descriptive analysis showed that out of a total of 120 respondents, the majority were external auditors (45%), internal auditors (35%), and information technology practitioners (20%). Most respondents had more than 3 years of work experience (68%), which indicates that data was obtained from individuals with relevant competencies in digital auditing. The average value of all variables was in the high category (mean > 3.5), which indicates that respondents generally have a positive perception of the application of system and algorithm evaluation in audits.

Instrument Test Results (Validity and Reliability)

The results of the validity test showed that all questionnaire items had a correlation value (r-count) greater than the r-table (0.179), so it was declared valid. The reliability test showed that the Cronbach's Alpha value for each variable was above 0.70, namely algorithmic evaluation (0.87), system reliability (0.85), and audit quality (0.89), so that the instrument was declared reliable and consistent in measuring the research construct.

Classical Assumption Test Results

Classical assumption testing showed that the data met all the eligibility criteria of the regression model. The normality test showed normal data distribution (Sig. > 0.05). The multicollinearity test showed a VIF value of < 10 and a tolerance > 0.10, so there were no symptoms of multicollinearity. The heteroscedasticity test showed the absence of a specific pattern in the scatterplot, as well as a significance value > 0.05, so that the model was free of heteroscedasticity. Thus, the regression model is feasible for use in hypothesis testing.

Results of Multiple Linear Regression Analysis

The results of the regression analysis showed that the evaluation of the system and algorithm had a positive and significant influence on the quality of the audit. In detail it is presented in the following table:

Table 1. shows the results of multiple linear regression tests

Independent Variables	Coeficin Beta	t-count	Sig.
Algorithm Evaluation	0.421	5.832	0.000
System Reliability	0.368	4.915	0.000

A determination coefficient value (R^2) of 0.62 indicates that 62% of the variation in audit quality can be explained by algorithmic evaluation variables and system reliability, while the remaining 38% is influenced by other variables outside the model.

Mediation Test Results (System Reliability)

The results of the Sobel test showed that the reliability of the system played a significant mediating variable in the relationship between algorithm evaluation and audit quality (z-value = 3.45; $p < 0.01$). This shows that the improvement in audit quality is not only directly influenced by the evaluation of the algorithm, but also through the improvement of the reliability of the information systems used.

Key Research Findings

The main findings of the study show that the evaluation of systems and algorithms has a significant influence on improving audit quality, especially in terms of accuracy and process efficiency. In addition, system reliability has proven to be a key factor that strengthens the relationship between algorithmic evaluation and audit quality, demonstrating the importance of a stable and reliable system infrastructure. Technology-based audits also show advantages over traditional sampling-based audits, especially in the ability to detect anomalies more quickly and thoroughly. On the other hand, respondents who had higher levels of digital competence tended to show better audit effectiveness, which confirms that the human resource factor remains an important element in the successful implementation of technology-based audits.

Comparison with Previous Research

The results of this study are consistent with previous findings that state that digital technology improves audit quality, especially in terms of efficiency and accuracy. However, the study provides new findings by showing that the reliability of the system plays a significant mediator, which has not been widely discussed in previous studies. In addition, the study emphasizes that algorithmic evaluation is not just an aid, but as a core component in the modern audit framework.

DISCUSSION

The results of the study show that system and algorithm evaluation have a positive and significant effect on audit quality. These findings confirm that in the digital ecosystem, audit quality is no longer only determined by the rigor of inspections of financial documents, but also by the auditor's ability to assess how data is generated, processed, and decided by digital systems. Conceptually, these results are in line with the shift from traditional auditing to data-driven auditing and continuous auditing, which is an audit approach that emphasizes testing data populations in a broader, faster, and more real-time manner. Cutting-edge literature suggests that the use of AI, data analytics, and automation does expand auditors' capacity in anomaly detection, evidence extraction, and risk evaluation, although the highest benefits typically arise from the use of "simple AI" and structured automation, rather than on complex AI models that are still evolving to be applied in audit practice.

Theoretically, these findings can be explained through the perspective of socio-technical systems, which views the quality of organizational results as the product of interaction between the technical subsystem and the social subsystem. In this study, the evaluation of the algorithm did not work alone; Its effectiveness depends on the extent to which the system can be audited, documented, monitored, and understood by auditors. The latest study on AI-based audits confirms that the issues of auditability, documentation, monitoring, and auditor readiness are the main requirements for technology to truly improve audit quality, not just add complexity to the process. Thus, the results of this study reinforce the argument that the reconstruction of the audit framework should shift the focus from "examining the output of the report" to "assessing the design, control, and behavior of the system that produces those outputs."

An important second finding is that system reliability plays a significant mediator in the relationship between algorithm evaluation and audit quality. This means that algorithmic evaluation does not automatically improve the quality of audits if the information system that is the object of the audit is not reliable. Reliable systems provide consistent data trails, process integrity, operational stability, and traceability of digital decisions; All of this strengthens the quality of audit evidence. Substantively, these results expand on previous literature that tended to emphasize the benefits of AI and analytics to quality audits, but have not yet placed system reliability as a key explanatory mechanism. These findings are important because they show that the benefits of auditing technology are conditional, i.e. they emerge stronger when system infrastructure, data quality, and digital controls have matured. In this context, this research contributes to the development of accounting science by adding a causal explanation that the quality of digital audits is formed through chains:

Algorithm Evaluation → Increased System Reliability → Improvement Of Audit Quality.

The results of the study also show that system- and algorithm-based audits are superior in anomaly detection accuracy and process efficiency compared to the sampling-based inspection approach. Logically, this happens because digital

systems allow for the processing of much larger volumes of data, the tracking of repetitive transaction patterns, as well as the identification of outliers that are not easy to find through manual procedures. These findings are consistent with field studies showing that AI and analytics tools are particularly useful for data extraction, risk identification, and automation of certain audit tasks, especially at document-intensive and transaction-intensive stages. However, the results of this study also need to be read carefully: technological advantages are more evident in the aspects of efficiency and pattern detection, while the aspect of professional judgment remains central in the assessment of materiality, business context, and risk interpretation. Recent research even emphasizes that emerging technologies are pushing the audit process to be more adaptive, but that doesn't mean it replaces the skepticism of auditor professionals.

The finding that auditors' digital competence strengthens the effectiveness of digital audits is also very significant. This means that the same technology does not produce the same audit quality when used by auditors with different levels of digital literacy. This is in line with the literature that places analytical skills, systems understanding, and professional adaptation as the main prerequisites for audit transformation. Recent systematic studies show that the future of the audit profession is not only determined by the availability of technology, but by the success of this profession building a combination of accounting knowledge, control understanding, data competence, and technology risk assessment capacity. From a theoretical point of view, these findings reinforce that the reconstruction of the audit framework should include a redefinition of auditor competencies, not just changes in audit procedures. Thus, this research contributes practically by emphasizing the importance of digital training, standardization of technology audit competencies, and updating the accounting-audit education curriculum.

When compared to previous research, the results of this study essentially support the majority of studies that conclude that digitalization increases audit effectiveness, but also shows important differences. Some previous studies have described the adoption of AI in audits as highly advanced, while recent field studies have shown that widespread use is still dominated by relatively simple tools, while complex AI models are still limited due to explainability, bias, privacy, and stronger governance constraints. This difference can be explained by the context of the research, the level of digital maturity of the organization, and the definition of the technology used. In this study, the positive influence of technology was still found, but it was not interpreted as a full substitution for auditors. On the contrary, the results show that technology provides added value when integrated into reliable systems, controlled processes, and adequate auditor competence. In other words, the study takes a more balanced position: not techno-optimistic, but augmentation-oriented, that is, technology reinforces human audits, not replaces them.

This finding has quite broad theoretical consequences for the development of accounting and auditing science. First, this study supports the need to expand the concept of quality auditing from the classical basis that emphasizes the verification procedure of financial statements to a base that also includes system auditability, data quality, and model/algorithm evaluation. Second, this study

connects the financial audit literature with the algorithm auditing literature, which has been developing relatively separately. Contemporary studies of algorithm auditing emphasize that algorithmic auditing is the practice of assessing the safety, legality, ethics, and risks of algorithmic systems through appropriate socio-technical interventions. When such a perspective is brought into the realm of accounting, then modern audits must include not only "whether the numbers are correct," but also "whether the system that produces those numbers is trustworthy, explainable, and accountable." It is this contribution that makes this research relevant as a conceptual bridge between financial audits, systems audits, and algorithmic audits.

Practically, the implications of this study target three main actors. For public accounting firms and internal audit units, these results show the need to invest in system quality, standard operating procedures for algorithm evaluation, and auditor capability development. For regulators and professional associations, these results indicate the need for more operational AI and digital systems audit guidelines, especially related to model documentation, change control, data lineage, monitoring, and AI risk governance. For organizations that use digital systems, this study confirms that the quality of external and internal audits will be increasingly influenced by the maturity of their own system governance. These implications are in line with current professional guidance that emphasizes the importance of structured, principles-based guidance for auditing AI risks and the control processes that come with them.

However, this study also has some limitations. First, the cross-sectional design makes the relationships between variables read as model-based causal associations, but have not yet fully captured the dynamics of the implementation of audit technologies over time. Second, data based on respondent perceptions has the potential to give rise to common method bias, especially in variables such as audit quality and system reliability. Third, the context of respondents dominated by auditors and practitioners with different exposures to technology can lead to variations in the meaning of the term "algorithm evaluation." This limitation is important because the latest literature itself shows that AI audit practices are still very heterogeneous between organizations and between levels of technological maturity.

Based on these limitations, further research should be carried out in several directions. Subsequent research can use longitudinal design to look at changes in audit quality before and after the adoption of certain technologies. Research can also extend the model by including variables such as AI governance, data quality, model transparency, and organizational risk culture. In addition, a mixed methods approach would be useful to dig deeper into how auditors actually evaluate systems and models in practice, including the points of conflict between technological efficiency and professional skepticism. Comparative research between sectors or between countries is also needed because regulations, digital infrastructure, and professional readiness can produce different patterns. In this direction, the development of audit science can move from simply proving the benefits of technology to the formation of a more mature, standardized, and cross-contextual digital audit framework.

CONCLUSION AND RECOMMENDATIONS

This study concludes that the reconstruction of the audit framework from the financial inspection approach to the evaluation of systems and algorithms significantly improves the quality of audits, as evidenced by quantitative approaches and regression analysis. Algorithmic evaluation has been shown to have a direct effect on audit quality, with system reliability as a mediating variable that strengthens the relationship, thus showing that the effectiveness of audits in the digital era is highly dependent on the quality of information systems and digital competence of auditors, not solely on traditional audit procedures. Based on these findings, it is suggested that further research use a longitudinal or mixed methods approach and add variables such as AI governance and data quality to enrich the analysis, while practically organizations and auditors need to improve digital competencies and strengthen system reliability so that the implementation of algorithm-based audits can run more optimally, adaptively, and sustainably.

ADVANCED RESEARCH

Organizations should strengthen information system reliability and integrate system and algorithm evaluation into audit practices to improve audit quality. Professional bodies and regulators are encouraged to develop clearer standards for digital and AI-based audits. In addition, auditors should continuously enhance their digital competencies in data analytics and information systems. Future research should consider longitudinal designs and include variables such as AI governance, data quality, and algorithm transparency to enrich the understanding of digital auditing.

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